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ABSTRACT

The document presents an evaluation of the two year Bachelor of Science Agriculture program for Gramsevaks, or village level workers, initiated by the G. B. Pant University of Agriculture and Technology, India in 1961. An employment questionnaire was sent to all agricultural graduates, 1963-71, for whom valid addresses existed. A return rate of 52% for two year degree Gramsevaks and 32% for regular three year degree holders resulted, with data analyzed through cost-benefit analysis. Results indicate that the Gramsevak program demonstrated the effective use of a program of recurrent education both from the standpoint of efficiency and equity. The social rate of return was shown to be equal to or greater than the comparable return for the regular agricultural graduate. The higher return was dependent on the reduction of the program for Gramsevaks by one year. The one year reduction in the degree program was tantamount to substituting five years of experience in agricultural extension for one year of university course work. The better academic performance of Gramsevaks despite weaker educational background and being out of school for 10 years or more indicated that no deterioration occurred in their ability to perform in an academic environment. (Author/LH)

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January, 1974

UNIVERSITY TRAINING FOR GRAMSEVAKS IN INDIA

AN EXAMPLE OF RECURRENT EDUCATION IN A LOW INCOME COUNTRY

By

Richard L. Shortlidge, Jr.

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University Training for Gramsevaks in India: An Example of Recurrent Education in a Low Income Country*

Richard L. Shortlidge, Jr.

Introduction

Recently it has become fashionable to discuss a concept of life long or recurrent education. Recurrent education may be viewed as encompassing two types of decisions. The first involves the postponement of educational investments and the second educational investments in older individuals.[1] This paper concentrates on the second type using as the criteria of evaluation economic efficiency and equity. Unlike most of the discussion in the available literature, this paper employs both criteria to evaluate a scheme of recurrent education in a low income country.

In 1961 at the request of the Government of India, G. B. Pant University of Agriculture and Technology initiated a special two year Bachelor of Science Agriculture program for Gramsevaks or Village Level Workers.[2] To qualify for admission, Gramsevaks had to meet these minimum qualifications: first, a pass in both the high school and intermediate examinations;[3] second, a pass in the two year diploma course for Gramsevaks;

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1 Vladimir Stoikov, "Some Neglected Economic Issues," International Labour Review (to appear in a forthcoming issue).

2 The university was the first agricultural university to be established in India using the U.S. land grant system as a model. The first class of agricultural and veterinary students were admitted in 1960. The university is located in Nainital district of Uttar Pradesh.

3 Intermediate is equivalent to twelve years of schooling. "Pass" roughly corresponds to "C" in the U.S. grading system.

and third, five years of experience in extension or its equivalent. The program represents a departure from the normal three year undergraduate program in agriculture: first, by lowering its admission standards with respect to previous academic work; and second, by decreasing the degree program by one year. The one year reduction in the degree program is tantamount to substituting five years of experience in agricultural extension for one year of university course work.

With a decade of experience behind the program, it is legitimate to raise the issue of its effectiveness. The analysis asks two questions. First, has the program been a profitable investment of society's resources compared to the regular three year program? Second, does the program offer an effective means of reaching a lower socio-economic group otherwise excluded from the opportunity of higher education?

The efficiency criterion is applied through Cost Benefit Analysis.[4] On the other hand, the equity criterion is handled by comparing the socio-economic backgrounds of Gramsevaks and regular undergraduates. No attempt is made to construct a model of economic efficiency with attached equity weights.

Data Sources

Between its first commencement in 1963 and 1971, the university awarded 802 Bachelors of Science Agriculture. This represented 678 regular three year degrees and 124 two year degrees for Gramsevaks. During April 1971 an employment questionnaire was mailed to all agricultural graduates for whom valid addresses existed and known to be living within the region served by India's domestic postal system.[5] By June 1971 sixty-four graduate Gramsevaks and 215 Bachelors of Science Agriculture had responded. This corresponded to 52 percent of the Gramsevaks and 32 percent of the regular agriculture graduates.

On the questionnaire graduates were asked to give a complete accounting of current employment and any previous post graduation employment. The employment inventory included name and address of employers, job title or description, dates employment commenced and

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4 E. J. Mishan, Economics for Social Decisions: Elements of Cost-Benefit Analysis. (New York: Praeger Publisher, 1973).

5 The research was part of a project to evaluate all degrees awarded by the university in light of the employment experience of its graduates over the decade. See Richard L. Shortlidge, Jr., "The Employment and Earnings of Agricultural Graduates in India: A Benefit-Cost Case Study of G. B. Pant College of Agriculture and Technology" (Ph.D. diss., Cornell University, 1973).

terminated, and gross monthly earnings. To measure intra-firm changes, graduates were asked to supply details concerning promotion, etc. For any period of inter-firm movement, graduates listed periods of unemployment including the immediate post graduation period.[6]

The university's annual expenditures over the decade were collected from the official budgets of the university for the 1960's. This formed the foundation for the estimation of the annual recurring cost per student enrolled. Depreciation and maintenance costs for the university's physical plant were furnished by the comptroller and the engineering staff of the university's public works department.

Socio-economic characteristics of students expecting to graduate in July 1971 were gathered through a ten percent random sample of seniors. This sample included 40 students.

The Model

The efficiency criterion utilized is the internal social rate of return, a discount rate equating the present value of a stream of net benefits accruing to society from the investment to the present value of resources, with alternative uses, utilized in the investment. Thus,

$$PV_{SB} = PV_{SC} \qquad (1)$$

where PV_{SB} equals the present value of the stream of net social benefits and PV_{SC} the present value of a stream of social costs. Since both PV_{SB} and PV_{SC} are incurred over time, equation 1 may be written:

$$\sum_{i=1}^{n} \frac{SB'_i}{(1 + SR)^i} = \sum_{i=1}^{n} \frac{SC_i}{(1 + SR)^i} \qquad i = 1, \ldots, n$$

or

$$0 = \sum_{i=1}^{n} \frac{SB'_i - SC_i}{(1 + SR)^i} \; j \qquad (2)$$

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[6] Unemployment was defined as the length of time without work during which the individual was actively seeking work. Specifically excluded were vacation and personal time taken between jobs.

in which SR, the internal social rate of return, equates net present value of social benefits, SB_i', to the present value of social costs, SC_i.

The stream of benefits to society involves (1) those that result in net direct increases in national income and (2) those that involve net increases in social welfare customarily omitted from national income accounts. Net increases in national income resulting from educational investments are measured by the increase in labor productivity and the contribution that education makes to the efficient use of technology.[7] Indirect social benefits or externalities omitted from national income accounts include, to name only a few, (1) the contribution of education to the enrichment of human life, (2) the reduction in the cost of transmitting ideas and technology, (3) the education of future generations, (4) increase in real household income resulting from an efficient use of resources in the satisfaction of household needs, and (5) decrease in birth rates.[8]

For purposes of analysis, it is assumed that the net social benefit, SB_i', is measured by the incremental increase in earnings resulting from the investment. Furthermore, this increase represents a net gain in productivity. To the extent externalities result in net gains, the rate of return estimated by relying on earnings differentials underestimates the real social rate of return.

Similarly, social cost measures the real opportunity cost of the resources invested. To the extent externalities and spillovers are not reflected in factor price relationships, market prices will be poor indices of the real cost to society in undertaking the investment.

Net social benefits, SB_i', are measured by the incremental increase in earnings which results from the investment in an additional unit of education. Since non-school factors such as ability and socio-economic characteristics of the family contribute to observed differences in earnings, the full amount of an earnings increment cannot justifiably be attributed to education as long as data are not standardized for

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7 Finis Welch, "Education in Production," Journal of Political Economy, Vol. 78 (January/February 1970), pp. 35-59.

8 Burton A. Weisbrod, "External Effects of Investment in Education," in Economics of Education 1, ed. Mark Blaug (Baltimore: Penquin Book Inc., 1968), pp. 156-182; Robert T. Michael, "Education in Nonmarket Production," Journal of Political Economy, Vol. 81, Part 1 (March/April 1973), pp. 306-327.

those characteristics. It is appropriate to allocate only a proportion of the increment to schooling. This adjustment, A_o, is the effect of non-school factors, and $1 - A_o$ measures the portion of net earnings accounted for by the difference in schooling.[9]

The net social benefit, SB_i', in year "i" must also account for the probability of living to the i-th year. Therefore, the stream of benefits should be adjusted by the probability of living from the initial period of the investment, year "o" to the i-th year. This adjustment is, L_o^i, in equation 3.

$$0 = \sum_{i=1}^{n} \frac{[(1-A_o)\, SB_i' - SC_i]\, L_o^i}{(1 + SR)^i} \qquad i = 1, \ldots, n \quad (3)$$

Estimation of Earnings

A simple regression model was developed which explained the variation in monthly earnings measured in Rupees, Y_m, as a function of a set of independent variables, X_j:

$$Y_{mi} = f(X_{ji}) \qquad \begin{array}{l} i = 1, 2, \ldots., S \\ m = 1, 2, \ldots., n \\ j = 1, 2, \ldots., p \end{array}$$

where Y_{mi} is the monthly earnings in Rupees in the m-th month for the i-th individual since graduation, and X_{ji} the set of independent variables for the i-th individual.

The model postulates that the independent variables comprising the set of X_{ji} are multiplicative rather than additive. Furthermore, the set is divided into two subsets:

$$X_{Li}$$

and $$L + R = J$$

$$X_{Ri}$$

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9 There is a growing number of empirical papers on the effect of non-school factors on earnings. These suggest that Denison's measure of 40 percent for Ao may be too high. Burton A. Weisbrod and Peter Karpoff, "Monetary Returns to College Education, Student Ability, and College Quality," Review of Economics and Statistics, Vol. 50 (November 1968), pp. 491-497; Zvi Griliches and William M. Mason, "Education, Income, and Ability," Journal of Political Economy, Vol. 80, Part II (May/June 1972), pp. S74-S103.

The first subset, X_{Li}, is composed of variables affecting the initial earnings of graduates. These are determinants of the earnings of graduates. These are determinants of the earnings in the first job. The second set, X_{Ri}, may affect earnings at any given point in time, but primarily at times of promotion and job changes.

The first subset, X_{Li}, includes:

X_{1i} = Year of Graduation;

X_{2i} = Age at Graduation;

X_{3i} = Overall Grade Point Average; and

X_{4i} = Initial Period of Unemployment in Months.[10]

The second subset, X_{Ri}, includes:

X_{5i} = Number of Jobs Previously Held;

X_{6i} = Location of the Job in Uttar Pradesh State;[11] and

X_{7i} = Number of Months Since Graduation.

The functional form selected was:

$$Y_{mi} = aX_{1i}^{b_1} X_{2i}^{b_2} \ldots X_{6i}^{b_6} X_{7i}^{b_7} [\exp (c_1 X_{7i}^{-1})] . \quad (5)$$

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10 The only observed period of significant unemployment occurred during the immediate post-graduation period and prior to the first job. This substantiates a similar conclusion of Mark Blaug using a broader cross-section of the college educated population in India. Mark Blaug, et al., The Causes of Graduate Unemployment in India. (London: Allan Lane the Penquin Press, 1969), p. 75.

11 In 1960-61 out of fourteen states in India, Uttar Pradesh ranked tenth in per capita income. States with lower per capita incomes included Andhra, Pradesh, Rajasthan, Orissa, and Bihar. For 1960-61, the average per capita income in India was Rs. 336 (approximately US $47 at current rates) and in Uttar Pradesh Rs. 292 (approximately US $41). National Council of Applied Economic Research, Estimates of State Income, (New Delhi: N.C.A.E.R., 1967), table 5, p. 57.

This function was selected because it is linear in logs and can be estimated by ordinary least squares, it proved a reasonably good fit to the data without violating the underlying assumptions of OLS, it was consistent with expected characteristics of age earnings profiles, [12] and it produced reasonable projections of the life earnings of graduates.

The earnings of graduates varies according to the type of firm in which they are employed. To measure these differences, employers are classified into five general categories which are introduced in the equation as dummy variables.

D_1 = University research, extension, and/or teaching;

D_2 = Government of India corporations or research institutions;

D_3 = Military service;[13]

D_4 = State government; and

D_5 = Farming and private business.

Employment category is assumed to interact with the variable "months since graduation," X_7, which gives the estimated age earnings profile its characteristic shape. Incorporating category of employment, equation 5 becomes:

$$Y_m = a X_1^{b_1} X_2^{b_2} \ldots X_7^{b_7} [b_8D_1+b_9D_2+b_{10}D_3+b_{11}D_4+b_{12}D_5] [\exp (c_1X_7^{-1})]. \quad (6)$$

Results of the Regression

Equations were estimated (1) for the regular three year agriculture undergraduate and (2) for the special two year degree for Gramsevaks. Results are presented in Table 1. With 97 percent of the jobs held by

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[12] Other functional forms were tested including the omission of the exponential term, $[\exp (c_1 X_7^{-1})]$, and the removal of the constraint which includes time as an inverse. In the former, the exponential term becomes $[\exp (c_1 X_7)]$. In both these cases, similar results were obtained regarding "goodness of fit," or explanatory power of the function. However, these functions give unreasonably high projections for the age earnings profiles.

[13] This category, although employed in the initial runs of the equation, was dropped in the final form presented here because of too few cases.

Gramsevaks in state government, the dummy employment variables were omitted in the estimation of their equation.

Year of graduation, Ln X_1, is significant in both equations, the more recent the degree the higher initial earnings. The variable primarily accounts for changes in pay associated with increases in Dearness Allowance in the public sector and bonuses in the private sector, since no significant change occurred over time in the initial employment pattern of graduates which would be reflected in higher starting salaries.[14]

Overall grade point average, Ln X_3, is significant. A higher academic record at the university is associated with higher earnings. From the values of the coefficients in two equations, the impact of grades is more pronounced on the earnings of the regular three year graduate. Regular three year graduates employed in private business and Government of India sponsored corporations have higher grade point averages than those employed in state government, although the differences in mean grade point averages among these groups is not significant statistically. Higher grades are also associated with entry into the firm at a higher grade. For Gramsevaks, higher grades resulted in a decrease in the time lag between graduation and promotion.[15]

The initial period of unemployment, Ln X_4, is significant for both earnings functions. The anomalous behavior of the coefficient in the Gramsevak equation is explained by reference to a small number of Gramsevaks who did not return to state government service. The normal pattern for Gramsevaks is a return to their previous post upon graduation before being promoted. For this group unemployment is zero. On the other hand, three percent of the Gramsevaks failed

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[14] Base pay is determined by Pay Commissions in India. These commissions are established by the Central Government for their employees and independent Pay Commissions in the various states for state government employees. For Central Government employees, the last relevant Pay Commission was 1959. Recently the Third Pay Commission submitted its recommendations to the Government of India, but at the time of this paper's writing no action has been taken to implement their recommendations.

[15] Overall grade point average, Ln X_3, and number of previous jobs held, Ln X_5, are not highly intercorrelated. The impact of grades on earnings is through a decrease in the time that elapses between being hired and the first promotion, not the number of promotions.

to return to their original positions. Unemployment is observed among this group. Yet since they secured positions outside state government service at higher pay scales, unemployment has a positive effect on earnings. For the regular three year graduate, longer periods of initial unemployment are reflected in lower starting salaries. This indicates a willingness among graduates to lower their reservation wage as the number of months unemployed increases.

Employment in Uttar Pradesh, Ln X_6, results in significantly lower earnings for both groups of graduates. This is as anticipated on the basis of knowledge concerning state-wise annual per capita income in India.

Over the graduate's life-time, employment in private business or farming means significantly higher earnings than employment in other areas. The coefficients for employment in university research, extension, and/or teaching, Government of India corporations or research institutions, and state government employment are not significantly different from the one estimated for Ln X_7. Therefore, the incremented increase in earnings associated with months since graduation for graduates employed in these areas is not statistically different from the one associated with Ln X_7.

Both time variables are significant. Earnings increase over time, but each successive month adds less to earnings than the previous month, due to the impact of c_1 / X_7. Thus, the function has the property of increasing at a decreasing rate. The inverse of time, c_1 / X_7, may measure the deterioration in a unit of human capital with the passage of time. The greatest increment in earnings occur in the immediate post-graduation period. Without further investments to upgrade the individual's human capital stock, previous investments will contribute increasingly less to an individual's earnings.

Number of jobs previously held, Ln X_5, is significant only for Gramsevaks. This variable measures the impact of promotion on earnings.

In both equations reasonably good fits are obtained. The R^2 adjusted in the equation for Gramsevaks is .661 and for regular Bachelors of Science Agriculture .541.

Summary projected life time earnings are given in Table 2. The average age at graduation is 31 years for Gramsevaks compared to 21 for regular agriculture graduates.

Estimation of Social Costs

Social costs include the total value of resources allocated to a particular educational activity. For Pant University, the relevant costs are (1) annual recurring expenditure per student, (2) annual rent per student for the fixed capital invested in buildings and other durable assets used in teaching, (3) student's annual expenditure on books and stationery, (4) net annual cost for food and lodging while at the university,[16] and (5) loss in productivity while in school.

The annual recurring expenditure per student and the annual rent per student were computed from the official university records. First, the annual expenditures for staff and contingencies were assumed to be the major items of recurring expenditure. For each year a per student cost was estimated. Second, the per student rent was calculated by summing the university's investment in its physical plant for the 1960's, depreciating these costs using a straightline method over a sixty year period, and dividing by the number of students enrolled. In addition, the cost of annual maintenance was computed by assuming them to be one percent of construction costs.[17]

To treat all these costs as instructional costs would shoulder teaching with the full costs of operating the university. The costs are in fact joint costs reflecting besides teaching the costs of research and extension. Therefore, only a proportion of the total costs are bonafide instructional costs.[18] Using the Programme Directory for the Third Trimester 1970-1971, it was estimated that 29.0 percent of the staff's time in the College of Agriculture was devoted to teaching and related functions. With the expansion of both extension and research over the decade, it was assumed that in 1960 approximately 80 percent of staff time was devoted to teaching, declining steadily to 29.0 percent in 1970-1971. Multiplying these derived annual proportions by the per student recurring and rent costs weighted by the number of students enrolled, an average cost was estimated for the decade. Refer

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[16] An individual has food and lodging costs in his alternative activity. Therefore, the costs associated with schooling are those that are a direct result of going to school. If the alternative is indeed remaining at home, the costs to society are any additional food and lodging costs associated with sending an individual to school.

[17] The use of a sixty year depreciation period and a one percent of construction cost for maintenance was based on discussions with the engineering staff of the public works department at the university.

[18] This assumes no complementarities among these three functions. This is a simplistic assumption adopted for convenience since no suitable procedure existed for determining these complimentarities.

to Table 3 for a breakdown of the social costs.

The per student annual recurring and rent costs for the administration complex including library were estimated following the procedure outlined above. Instead of partitioning the costs to teaching, the assumption was made to allocate to teaching the full recurring annual expenditures plus depreciation. This was done for two reasons. First, no reliable means was found for assigning a percent of the administrative costs to teaching. Second, it was felt that the administrative complex was largely an adjunct of the teaching activities of the university, although it preipherally serves research and extension facilities.[19]

Based on a survey of ten percent of the students expecting to graduate in July 1971, the annual expenditure on books for a student in the College of Agriculture was Rs. 52. It was assumed that both Gramsevaks and regular Bachelor of Science Agriculture students spent equal amounts on books.

From the records available in the comptroller's office the per student annual expenditures on food and hostel were calculated. The average Gramsevak spent Rs. 467 the first year for food and lodging and Rs. 601 the second. The average regular Bachelor of Science Agriculture student spent Rs. 481 the first year, Rs. 563 the second, and Rs. 645 the third. These are averages for the decade of the 1960's. To arrive at a net cost per student required an estimation of the cost of living at home. The National Sample Survey's 13th, 16th, and 18th rounds contain information on per capita monthly food expenditure by consumption class for Uttar Pradesh state.[20] Based on the survey of seniors which indicated an average monthly parental earnings of Rs. 823, students were placed in the highest consumption expenditure class utilized by the National Sample Survey. For each year between those reported in the National Sample Survey and the period after 1964, per capita monthly food expenditures were calculated through interpolation and extrapolation of trends in average per capita expenditure and the proportion spent on food. Assuming an average

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[19] The administrative complex is largely taken up with offices directly related to teaching such as the registrar, student welfare, and the comptroller.

[20] Cabinet Secretariat, Government of India, "Tables with Notes on Consumer Expenditures," National Sample Survey, 13th round, September 1957 - May 1958, (Delhi: Manager of Publications, 1962); Cabinet Secretariat, Government of India, "Tables with Notes Consumer Expenditures," National Sample Survey, 16th round, July 1960 - July 1962, (Delhi: Manager of Publications, 1965); Cabinet Secretariat, Government of India, "Tables with Notes on Consumer Expenditures (Preliminary)," National Sample Survey, 18th round, February 1963 - January 1964, (Delhi: Manager of Publications, 1968).

students remained at the university for ten months a year, the average annual food costs of staying at home were estimated. For the first year the estimated cost was Rs. 446, for the second Rs. 457, and for the third Rs. 469. With these estimates net food and lodging cost were derived.

Foregone earnings for Bachelors of Science Agriculture from the three year program were based on the earnings of Matriculates derived from the Urban Income Survey 1960.[21] Since the minimum qualification for admission to the program is intermediate (two years beyond matriculation), the use of this source underestimates the earnings foregone. To account for this and changes in pay over the decade for matriculates, the earnings were adjusted to 1971 prices using the "Consumer Price Index for Urban Non-Manual Employees" published monthly by the Reserve Bank of India.

Foregone earnings for graduate Gramsevaks were calculated from the data supplied on their returned questionnaires. A large share of the graduates listed their earnings before attending the university. These were compared with their earnings immediately after graduation before promotion. In this comparison, earnings failed to reflect an increase due to university training. Gramsevaks received higher earnings through the promotional advantages and opportunities available to them after receiving the college degree. Using the reported earnings prior to promotion, it was possible to estimate an alternative earnings stream.

Adjustments

The source of the mortality adjustment, L_0^i, was the life survivorship table for India in the UNO's Demographic Yearbook 1966. This table resembled the model life table given in the UNO's Age and Sex Patterns of Mortality: Model Life Tables for Underdeveloped Countries for a population with a life expectancy of 40 years. This overestimates the incidence of age specific mortality for Pant University graduates for two reasons. First, college educated individuals come from a higher socio-economic strata whose class specific mortality should be lower than those from lower strata due to differences in the standard of living. India's life tables are dominated by the poor and the rural. Second, the UNO's estimate of life expectancy in South Asia which included Nepal, India, Pakistan, and Bagladesh for the period 1965 to 1970 was 48 years. Therefore, the Deomographic Yearbook's 1966 estimate based on 1951 and 1961 census data fails to account for more recent changes in life expectancy.[22]

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[21] Mark Blaug, et al., The Causes of Graduate Unemployment in India, table 7.1, p. 171.

[22] Increasing life expectancy from 40 to 48 years has little effect on the computed internal rate of return. The effect of an increase in life expectancy alters the probability of living an additional 20 or more years more significantly than 20 years or less. The most relevant period for the computation of the internal rate of return is the first ten to fifteen years of the benefit stream.

The ability or non-school factor is assumed to be .40. Forty percent of the observed differential in earnings is related to non-school characteristics and sixty percent to schooling. The use of this proportion, although arbitrary, conforms to Blaug's use of .35 and .50 as well as Gounden's .50.[23] Evidence cited earlier from United States data suggests that the effect of non-school factors may be substantially less than 40 percent.[24] Similarly, in a study of education in Kenya, Thias and Carnoy find that the effect on non-school factors decreases as the level of schooling increases, the most pronounced effect being in primary school with little or no impact at the highest level.[25] Without the existence of a body of comparable evidence for India, the decision was made to use .40 percent to maintain conformity with the Blaug and Gounden studies.

The adjustment for non-school factors was employed for the regular agriculture graduate and not Gramesevaks. Since longitudinal earnings data existed for Gramsevaks in the pre and post graduation periods, the observed differential in earnings may be assumed to reflect only school related characteristics since all other factors are constant. On the other hand, the observed differential between the earnings of regular agriculture graduates and matriculates is a function of both school and non-school factors.[26]

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[23] Mark Blaug, et al., The Causes of Graduate Unemployment; A.M. Gounden, "Investmensts in Education in India," Journal of Human Resources, Vol. 2 (Summer 1967), pp. 347-358.

[24] See footnote 9.

[25] Weisbrod and Karpoff; Griliches and Mason; Hans Heinrich Thias and Martin Carnoy, Cost Benefit Analysis in Education: A Case Study of Kenya. (Baltimore: John Hopkins University Press, 1972).

[26] The use of the adjustment for the regular undergraduate and not Gramsevaks hinges on the measure of the alternative stream of earnings. For three year graduates the earnings differential is arrived at by comparing two data sources - the earnings of matriculates from the Urban Income Survey and the earnings of Pant University graduates. The Urban Income Survey represents a broader cross-section of the educated in India. A comparison of their socio-economic characteristics with those of Pant University students indicates that the latter come from a significantly higher social strata. If earnings are positively related to socio-economic characteristics, one may postulate that without a college education, the Pant University student would earn a higher wage than the average matriculate. Therefore, to use the average matriculate's earnings as a measure of the alternative earnings stream overestimates the rate of return due to schooling. One may argue that the use of a non-school factor adjustment of .40 goes to the other extreme of underestimation. However, if Ao is assumed to be .10, based on recent U.S. evidence, the conclusion of this paper, that both programs are equally as efficient, is not altered. The crucial factor in the analysis is not the use of Ao in one case and its absence in the other but the reduction in the degree program by one year for Gramsevaks.

Social Rates of Return

Two relevant pairs of social rates of return are computed. The first assumes no delay in the promotion of Gramsevaks.[27] In this case the social rate of return for Gramsevaks is compared with the return to regular three year agriculture graduates employed in state government service. The second assumes that the real measure of the social benefit from investment in Gramsevaks is the earnings of the regular three year agriculture graduate. The support for the latter assumption is threefold: first, the similarity in university training programs; second, the significantly higher grade point average for Gramsevaks while at the university; and third, the experience of Gramsevaks who elected not to return to their posts in state government service.[28]

A comparison of the academic performance of Gramsevaks and regular three year agiculture undergraduates indicates that Gramsevaks had significantly higher grade point averages. Objection may be raised that Gramsevaks take academically less demanding courses. No evidence of this appears in the university's course outline for each program. However, if theory courses are considered more difficult than practical courses and it could be shown that Gramsevaks take less theory, this

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[27] Graduate Gramsevaks realized the benefits of university training through promotion. Therefore, a long delay between graduation and promotion results in a net loss in social benefit as measured by earned income. The average promotional delay during the 1960's was 19.4 months. During this period the benefit to society from university trained Gramsevaks is not reflected in their earnings profile. For this reason, the earnings profile is computed assuming no promotional delay.

[28] It should be noted that the purpose of this paper is to compare the social rates of return of two degree programs offered by the university. Therefore, the conclusion depends on the relative relationship of the two rates of return and not their absolute levels. For example, the crucial question is which is higher or lower. Government subsidy on the cost side effects the private rate of return not the social, ceteris paribus. Government subsidy on the demand side through the establishment of pay scales does effect the absolute level of the rate of return, but it does so for any graduate employed in government service. The comparison of the rates of return to both Gramsevaks and regular agriculture graduates employed in state government service is made to compensate for observed differences in their employment pattern. The use of the earnings profile of regular undergraduates as a measure of the social benefits derived from training Gramsevaks is addressed to the absolute level of the social rate of return. Pay scales in state government service are lower than those in the large private corporations hiring regular agriculture graduates. Therefore, the lower pay of Gramsevaks compared to regular agriculture graduates underestimates the social benefit.

would not alter the argument. It can be demonstrated that the practical agricultural courses offered by the university are one of its distinguishing characteristics which differentiates Pant University agricultural graduates in the labor market. The evidence for this is twofold. First, in discussions with private businessmen at Pant University the outstanding practical training of students was emphasized as important in their hiring policies. Also students by in large felt that employers placed more emphasis on practical training. For companies serving the agricultural sector, this form of training is highly valued. Second, a large proportion of agricultural undergraduates is initially employed in university research and extension for up to two years after graduation. From these jobs, graduates move to higher paying positions in private business. Therefore, employment in university research and extension may be characterized as appendant practical training to the formal educational program of the university and hence a stepping stone to private sector employment.

In the case, comparing returns in state government employment, the average social rate of return for Gramsevaks is 8.3 percent compared to 9.9 percent for the regular agriculture undergraduate employed in state government service. In the case, comparing the earnings profile of regular agriculture graduates, the social rate of return to Gramsevaks is 13.5 percent compared to an average of 10.3 percent for the regular agriculture graduate.

Given the similarity in training experience, the higher academic performance of Gramsevaks, and the ability of a few Gramsevaks to compete effectively in the same employment market, the claim might be made that the program is more efficient than the regular three year one. However, given the lack of evidence concerning the actual alternative stream of earnings for regular agriculture graduates, a more reasonable conclusion is that the Gramsevak program is at least as efficient as the regular undergraduate one. This is attributable to the one year reduction in the degree program for Gramsevaks which counters their shortened work life. Gramsevaks, who are older than regular undergraduates, have approximately ten less years in the labor force.

Equity Aspects

From the survey of ten percent of the seniors expected to graduate in July 1971, the estimated parental average monthly earnings was Rs. 823. Only four percent of the urban households and 0.9 percent of the rural households in India earned more than Rs. 500 per month. The vast majority, 80.3 percent of the urban and 90.6 percent of the rural had monthly earnings of less than Rs. 200.[29] For the forty percent of the Pant University seniors coming from agricultural families, the median land holding was 30 acres. This compares with an all India

[29] Mark Blaug, et al., The Causes of Graduate Unemployment in India, p. 131.

average of 5 acres.[30] Thus, the average student comes from the upper one percent among rural households.

Radhudkar's study of Gramsevaks estimated that the majority come from families owning ten to fifteen acres of land.[31] Approximately ten percent of India's landholders own more than ten acres.[32]

The Gramsevak program has allowed the participation of a lower socio-economic group in the Pant University's agricultural program. Although Gramsevaks by no means come from the lowest income groups in rural India, their inclusion in the university's agricultural progam is a significant step toward expanding the university's participation base. Without such a program of recurrent education, these groups would find it difficult to compete for admission to the regular three year program, given their socio-economic backgrounds.

Importance for Rural Development

The efficiency and equity criteria are satisfied in the university training program for Gramsevaks. It may be useful to speculate about the importance of the program for rural development. Extension plays an important role in the advance of new technology. Often there is a lack of information about the specifics of new agricultural practices. The traditional forms of cultivation no longer suffice. Having been shown that an innovation is profitable, the farmer's information requirements become increasingly more technical and specific. He needs information on disease control, planting times, fertilizer utilization, and water control. The response to these needs requires competent agriculturalist working at the village, block and district levels. Therefore, the university training of Gramsevaks with experience working in rural areas equips them to meet the emerging needs of rural development in India. By promotion to District Agricultural Extension Officers, the college trained Gramsevaks become an integral link in the development process by providing at a higher administrative level individuals who are aware of the practical side of agriculture in rural India, who have empathy with Gramsevaks working under them, and who have the technical skills to handle the flow of agricultural information downward to the village.

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30 B.S. Minhas, "Rural Poverty, Land Redistribution and Development Strategy," Indian Economic Review, vol. 5 (April 1970), pp. 97-128.

31 Wasudeo B. Radhudkar, "The Relationship of Certain Factors to the Success of Village Level Workers," Rural Sociology, vol. 27 (December 1962), pp. 418-427

32 Minhas

Conclusions

The Gramsevak program demonstrates the effective use of a program of recurrent education both from the standpoint of efficiency and equity. The social rate of return was shown to be equal to or greater than the comparable return for the regular agricultural graduate. The higher return is dependent on the reduction of the program for Gramsevaks by one year. The better academic performance of Gramsevaks despite weaker educational backgrounds and being out of school for ten or more years indicates that no deterioration has occurred in their ability to perform in an academic environment. It may well be that Gramsevaks are more motivated and aware of career objectives. These two factors may have compensated for any deterioration in learning ability.

Table 1: Estimation of Equation 6 in its Natural Log Form

Variable Identification	Estimated Regression Coefficient (standard errors) B.Sc.Ag. (Gramsevaks)	B.Sc.Ag. (Non-Gramsevaks)
1. Mean of dependent variable, LnY_m	5.7831	5.9356
2. Ln ε = intercept	2.8231*** (1.1106)	1.6254 (1.7576)
3. Ln X_1 = year of graduation	.3429***** (.0673)	.1359**** (.0497)
4. Ln X_2 = age at graduation	.2493 (.3155)	.4024 (.4512)
5. Ln X_3 = overall grade point average	.4109* (.2248)	1.1414***** (.2732)
6. Ln X_4 = initial period of unemployment in months	.0357**** (.0133)	-.0121** (.0060)
7. Ln X_5 = number of jobs previously held	.1713*** (.0732)	.0276 (.0589)
8. Ln X_6 = location of job in Uttar Pradesh	-.1493*** (.0607)	-.1799**** (.0601)
9. Ln X_7 = months since graduation	.3526***** (.0472)	.3435***** (.0518)
(a) b_8D_1 = employment in university research, extension and teaching		0[1]
(b) b_9D_2 = employment in G.O.I. corporations or research institutions		-.0013 (.0222)
(c) $b_{10}D_3$ = employment in military service[2]		---
(d) $b_{11}D_4$ = employment in state government		.0191 (.0250)
(e) $b_{12}D_5$ = employment in farming or private business		.0954***** (.0200)
10. c_1/X_7 = inverse of months since graduation	1.3295***** (.3070)	.9811** (.4355)
11. R^2	.661	.541

1. The effect of employment in this category is measured in the regression coefficient b_7.
2. Limited number of observations for military service prevented using this variable.

*Significant at .100; **Significant at .050; ***Significant at .020; ****Significant at .0101; and *****Significant at .001.

Table 2: Estimated Earnings of Gramsevaks and Regular Bachelor of Science Agriculture Graduates

Age	Annual Earnings in Rupees	
	Gramsevaks Graduating with B.Sc.Ag.	Regular Three Year B.Sc.Ag.
22		3016
23		3879
24		4571
25		5119
26		5582
27		5986
28		6348
29		6677
30		6981
31		7263
32		7528
33	2721	7777
34	3186	8014
35	3699	8239
36	4109	8453
37	4455	8659
38	4739	8857
39	5031	9047
40	5278	9231
45	6278	10,067
50	7049	10,798
55	7690	11,452
60	8246	12,047

Table 3: Per Student Annual Costs for the College of Agriculture

Expenditure Item	Costs Per Student	
Depreciation Plus Maintenance	Rs	
a. College of Agriculture Complex	124	
b. Administration Complex including library	43	
c. Hostel	220	
Subtotal		387
Annual Recurring Costs		
a. College of Agriculture	483	
b. Administration and Library	445	
Subtotal		928
Total		1315